AMERICAN

JOURNAL OF PHOTOGRAPHY.

Published by THOS. H. McCOLLIN & CO.

VOL. 10. PHILADELPHIA, NOVEMBER, 1889. NO. 11

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A NOVEL MEANS OF REMEDYING CERTAIN DEFECTS IN PORTRAITS.

A VERY clever definition of Photography that we once met with in the course of our reading, made our art "the art of delineating aspects scientifically." This covers the ground very well; in fact we have never seen anything better.

If we take the word "scientifically" in a free and liberal sense here, we might make it refer not only to true and faithful reproductions of objects, but to such scientific delineations of those objects as would tend either to the exaggeration of their beautiful qualities, or to the suppression of their ugly ones.

It is not our purpose to repeat in this connection any of the unctuous art-jargon concerning "truth in art," etc., which occupies by far too much space in the columns of our photographic literature, but rather to ask our readers to consider the merits of the following curious process, which at first might be regarded in the light of a caricature only.

Transformism, the process alluded to, is defined by M. Ducos du Hauron rather diffusely as follows: "An image, characterized by a change in the relative proportions of the objects represented, is formed if a ray of light be introduced into a dark chamber, not through a simple orifice, but through two slits cut in places which are differently directed, and separated by a proper distance." He then proceeds to give some examples which are startling, to say the least. It seems that when the first of the two slits is vertical, and the second (the one nearest the image) horizontal, the image when compared with the original will be found to be amplified or stretched vertically. Again, if one of the two slits instead of being rectilinear be curved more or less, the image will show curves or undulations laterally or vertically according to the direction of the slit. The examples therewith given are at least as strange and uncanny as the former ones. All the examples given are portraits, and here is the point that is so surprising—the natural likeness is well preserved in spite of the extreme distortion. The distortion of countenance seen in a convex mirror in some measure approches to it, but it is not the same.

The method of working adopted by M. du Hauron is quite simple, and we will here give a condensed account of it, premising that for certain unfortunate individuals possessing great facial deformities this process may prove valuable, the photographer

having it in his power to greatly exaggerate certain features, and to suppress others. It is this point to which we desire to direct our reader's attention, that the process, called "transformism" for want of any better name, puts into their hands the possibility of altering the features of the sitter, and yet of preserving the likeness while doing so. A sitter with a head so flat and wide as to be unsightly would be a good subject for trial with the first slit vertical and the second horizontal, as we mentioned above. Other examples will suggest themselves. M. du Hauron gives the following directions: "The best means of experimenting with photographic transformism is to provide a dark box so fitted up that twelve or more proofs may be made at one operation. Two partitions or septa are set into a deep frame, opposite to each other and to the sensitive surface at the bottom of the frame, the model being at the other end of the box and well lighted. Each of these two septa is pierced with twelve or more slits, which are brought opposite to each other and disposed in symmetrical rows. Two slits of any given form are then so placed that the desired deformation or distortion may be produced. The model will then be represented by as many different "transformisms" as there are pairs of slits. In the production of these images the slight distance separating the slits from the sensitive surface will greatly influence the action of the light, so that the exposure will remain within the limits absolutely practicable for portraiture. The proofs obtained will thus all differ the one from the other. A variety may be made by reversing the position of either one or both of the two septa above-mentioned, turning them upside down, etc. If a camera furnished with a battery of lenses of any desirable number were at hand, a plate of instantaneous proof-types might be made, with the same distances between as between the slits in the septa. This plate could then be set in place before the slitted septa in the dark box, and thus a series of instantaneous portrait transformisms obtained."

It is evident from the above description that the transformism is made from a ready-made portrait or picture; not done direct from the sitter. There are certain points in the process analogous to the pin-hole or diffraction principle of making views. Fun and recreation can be had from the above in plenty; but it is rather as an important means by which defects may be remedied in portraiture that we recommend it to all of our readers who are willing to experiment out of the beaten track.

In concluding let us add that the making of the slits requires care; they should not be broader than one-third of a millimetre. They should be drawn on white paper with india ink, rather large in size, and with clean edges and borders, then reduced to the desired measure by means of the camera. The negative of course must be on glass, and acts as the transforming screen.

ELLERSLIE WALLACE.

COMPOSITION OF PICTURES.

WHEN the photographer puts his head under the cloth, he perceives that there is a certain space to be fitted bounded by the four rigid lines of the focusing screen, and though he is conscious that he has not the same freedom in selection as the painter, he feels that much depends upon his ability to adjust the parts to a harmonious relation.

The great desire is to fill that space to the best advantage. The easiest way to do this he knows is to arrange the figures one after the other, faces all turned the same direction, much in the manner of the wall paintings of the Egyptians; but then such an arrangement involves neither skill nor thought. It requires a good deal of taste and judgment to dispose of the figures in groups so as to produce a pleasing variety in the attitudes.

There are certain general principles which have come to be accepted by the masters as applicable to figure compositions, and these the photographer may make good use of without needing to follow them blindly.

Whatever the subject of the picture, the eye is always attracted by the heads; therefore it is of the utmost importance to carefully consider their relative positions.

The heads in a group should never be equi-distant, or so placed that imaginary lines connecting them would form any regular geometric figure, as an arc of a circle, a square or triangle. Such a distribution is almost as offensive to the cultivated eye as the all-in-a-row arrangement.

By simply shifting the position of the figures it is easy to break up this unpleasant symmetry.

Two heads should never be in the same vertical line,—that is, one perpendicularly below the other. Suppose we have two figures: one standing, the other kneeling or sitting. It will give greater action to the group and more pleasure to the eye by bringing the head of the kneeling figure a little in advance of the standing.

If we have three figures to dispose of, two standing and one sitting, we should not arrange the group so that the sitting figure shall be equi-distant from the two standing ones.

Converging lines in a group are generally objectionable unless the convergence is necessary to the subject depicted. Where all the arms seem to radiate from one fixed point, the eye naturally turns, and when it finds there is nothing of interest, disappointment follows.

The management of the arms and hands, especially in a large group, is one of the most difficult problems to deal with. They cannot be put out of sight, but should be so disposed as not to attract special attention.

Sometimes in a group the arms and hands cross, but they should never cross at right angles, and it should also be remembered that obtuse angles in a picture are more pleasing than acute.

Repetition of lines is generally to be avoided, although sometimes a repetition of the same attitude in a minor degree is quite effective by way of emphasis.

The art of grouping cannot be learned without considerable experience.

At first one has a general idea how the space is to be filled, then the details have to be worked up, and a change in an attitude may require a corresponding change in

some or all of the others, until the original idea is abandoned for something else. Success is only attained by a continuous process of modification, addition and omission.

The principal figure of the group, that about which the others centre, should receive the most attention, but it is not necessary to place it in the centre of the picture, neither should it receive the greatest illumination. Unless the secondary or less important figures of the group are so arranged as to show their relation to the leading figure they will seem like trespassers upon the scene. Now as regards the size of the figures with reference to the dimensions of the plate. They should not be so large as to looked cramped in the space allotted to them. It is well to remember that sufficient room should be given for seated or stooping figures to arise if they felt so disposed. The impression should never be conveyed that they would thereby endanger their heads by coming in contact with the top of the plate.

The figures in the group on the other hand should not be so minute as to look stagey.

Finally, take care not to crowd the scene with too many items of interest. It is often a temptation to fill up an empty space, but frequently it is better to leave it vacant.

I. H. SUNDERLINE.

THE INTELLIGENT USE OF THE DETECTIVE CAMERA.

(*Read before the Liverpool Amateur Photographic Society.*)

SEEING that most amateur photographers now-a-days either possess or are about to possess a detective camera, and this being the season of the year when it can best be used, I thought a few words on the subject might be acceptable to some if not all of you. There are so many various kinds of detective cameras now in the market for the amateur to choose from that it would be impossible for any one to say which is the best, as most of them have all and every movement that can be required, the chief difference being that some are more convenient to use than others, —more notably one lately brought out by one or two members of this Society. This, however, is not so important a factor as knowing how and when to use the camera for its special purposes. As I am anxious not to weary you, I will commence by calling your attention to some of the advantages as well as disadvantages of this class of photographic work. As to the former, it is well known that its chief characteristic is *concealment of purpose*, thus enabling the operator to obtain "shots" at bits that probably could not be obtained with the ordinary uncovered camera, even though the same be held likewise in the hand. Again, the detective camera is very conveniently carried, always set up and ready for exposure. And last, but not least, we can alter the stop of the lens or speed of the shutter is less time than it takes one to write it. Many persons seem to think that this is all that is needed to enable them to take any kind of picture. That this is far from correct is only too plainly understood by the thoughtful worker.

When speaking of instantaneous pictures Mr. H. P. Robinson says, "Instantaneous pictures of a sort have become so easy of accomplishment that our exhibitions are flooded with them. These photographs may be very useful to painters because

they are real bits from nature,—real machine views, at least,—but they are not art. Yet if you look through an acre of them you will find every now and then you will come upon a gem."

On looking through my work done with the detective camera I have noticed that the greatest failures arise from bad focusing or shake of the camera when pressing the trigger of the shutter. Of course there are other faults, such as that some of the subjects were not worth taking, but then this applies to nine-tenths of photographic work, let it be with the detective or field camera, it matters not which.

Focusing.—This is a most important matter, for however good otherwise the picture may be, if it is not in good focus then it is practically useless for enlarging from or making lantern slides, whilst as a print it is anything but satisfactory. On looking over the many faults and errors made by myself and others, I find that perhaps quite 20 to 30 per cent. of the exposures made are, to more or less extent, faulty in this respect. In some price-lists of lenses we are told that a certain lens of 6-inch focus will define sharply all objects 19 feet away, when using the lens at *f*-8. That this is not borne out by my 5¾-inch Wray lens there can be no doubt, for with *f*-8, and keeping the distance reasonably sharp, the objects in the foreground to be in focus must not be nearer than 40 feet, whilst with *f*-5 to 6 neither I nor a photographic friend can get any sharp focus at all, thereby showing that this power, as a working one, is purely imaginary. We are also told by experts that the depth of definition of a lens is governed solely by its length of focus, or, to put it in other words, that all lenses equal in focal length have the same power of depth of definition. This, then, being so, it can be easily understood why a lens of so comparatively short focus (that will cover the plate well) is the best for use in the detective camera, for its real value and suitability lie in its power of giving great depth of definition, which is so valuable in a picture. This, then, brings us to the question, what is the proper focus, say, for a 5x4 plate? Having worked two lenses on this size plate of 5½ and 8¾ focus respectively, I find that the best focus for general use is one not over 6 inches, not even excepting shipping work, which is usually considered to require long focus lenses. Of course, if you cannot get near enough to the objects, then a long focus lens is a necessity. Many of you use finders with your detective cameras. I do not, as it requires but very little practice to enable one to know the angle the lens gives; besides, how can any one snap his shutter at the right moment unless he is carefully watching the object instead of looking at a finder, which gives so small an image as makes it practically impossible for him to see the various changes properly. If I do use a finder it will be for the purpose of obtaining a finer focus of the objects exposed upon. For instance, I would first place a man just sufficiently far away from the camera as would with, say, *f*-8 or other stop in general use, give me the man and extreme distance equally sharp. On the ground glass of the finder I would then mark in parallel lines the length of the man; I would then place him at a nearer point and again show the length of the man on the ground glass, and so on, until the man was of such a size that it would be unwise to proceed further on account of the great lack of depth obtainable in the picture. About three different sizes would be found sufficient. And now another matter may be mentioned. When working with very large apertures, pictures are often found faulty in focus on either the margin or middle. Now this is not always the fault of the lens, but of the worker, for two

persons may work with the same lens and stop, and on the same view, yet one picture may appear better focused than the other, for while one focuses sharply on the centre of the plate, the other does so on the whole of it, and thereby obtains sharpness generally. To illustrate this I will ask you to look at this group taken on board ship. You will notice how sharp the persons in front are, whilst those at the back and sides are far from sharp. The stop used was *f*-16, and this one might have thought would have brought all into focus; but no, the picture has been spoiled by my not focusing a point further off, which would have brought the two sides of the picture into better focus, and then have equalised the focus all over the plate, which the lens would do if properly used. Therefore, when I determine an object to be in focus at say 5 yards distance, I choose that it be only just in focus, and thus throw the difference on further objects into focus at the same time also. It is only by careful attention to these trivial points that the detective camera can be used successfully, not to say intelligently. And now we come to consider how the camera should be held when the plate is being exposed. Some, or perhaps I ought to say most, people hold it under their arm, at the same time peering into the view-finder. I myself prefer to bring the camera up in front of me, and whilst keeping my eyes fixed on the object, waiting for the correct moment to press the trigger. I may here mention that some time ago I developed some instantaneous shots for a professional friend (or I should say, dealer), who did not like to risk spoiling the plates himself, as they were for a customer who was an artist. They were all views of fishing boats and men, and I think I never saw such a capital collection of incidents. Somehow or other the figures were all caught at the right moment, neither too soon nor too late, Quoting Mr. Robinson once more, he says, "Nothing but a sound knowledge of those laws and constant practice will enable a photographer to make the immediate and lightning-like application of them which is necessary in instantaneous photography. In photographing scenes containing groups of figures, the best artists will get the best pictures. A photographer without a knowledge of art would simply 'fire into the brown of them,' as a sportsman would say, and trust to luck; while a photographer who knew something of the rules of composition would wait until his figures arranged themselves to advantage, and would know when was the best moment to pull the trigger of his camera."

Development.—After many trials of different developers for instantaneous work I decidedly prefer the following, viz.:—

Sulp. pyro	20 min.
Saturated solution soda	90 "

to each ounce of developing solutton.

The sulph. pyro. referred to is that made by Messrs. Sharp & Hitchmough, of this city, which is said by them to contain one grain of pyro. in every ten minims of solution. The saturated solution washing soda is made by putting into a jug a pound or so of the soda and then pouring over it a small quantity of boiling water, after which the saturated solution is poured off and then filtered into the stock-bottle; when quite cold crystals are formed, clearly showing that the solution is really a saturated one. I use no bromide whatever, as I have not found it at all necessary, even with plates over-exposed in the ordinary camera. As an instance of this I may mention that not long ago I gave a 10x8 plate 11 seconds with *f*-44 stop on an open

landscape, and developed the plate with the maximum quantity of soda, and I got neither fog nor flatness of image, because as soon as I noticed the image flash up I quietly made up a fresh developing solution with plenty of pyro in and no soda, then poured off the first developer and applied the latter, which quickly gave me the density, or rather, I should say, gradation desired in the negative. With a detective camera all the plates being under-exposed require forcing in development; therefore I would advise that on no account should the pyro be at any time stronger than 20 min. to each ounce of developer, as if so the resulting negative is certain to be too hard or chalky,—a disadvantage which afterwards cannot well be remedied, whilst a thin negative is always capable of being improved by intensification during development or even after being fixed. The importance of keeping back the pyro cannot be too strongly put before you, this and not the accelerator being the keynote of the resulting negative.

In the foregoing I have dealt with my method of working the camera, and must now confess that the results of detective work are far from being satisfactory, or all that can be desired. I honestly believe that it, in one way or another, costs more, or at least as much, as working a whole plate; and then, what is the average of good work? It is almost fearful to contemplate; but, of course, some persons may be so easily satisfied that they put all their negatives down for gems—provided they give a print at all. As an instance of this, I remember reading in a photographic annual an article written by a well-known amateur, who claimed for a certain picture he had taken that the principal object was quite sharp and full of detail; whereas, having seen a print from the negative, I find (1) one object is not even in proper focus, and (2) it possesses little or no detail whatever. The latter I do not find fault with, as such a speed of the shutter must of necessity not admit of much detail being secured. It may be thought clever to photograph trains quite sharply running at the rate of perhaps fifty miles an hour; but, at any rate, it is not art. It would be interesting to criticise some of the many pictures which some writers speak so glibly of in our photographic journals. I am afraid the gilt would fall off some of them, if carefully analyzed.

And now, in conclusion, those who intend going in for detective work need not despair of success in the highest degree, provided they will work it in an intelligent manner; or, in other words, not expect their machine to do all that is requisite, but use their brains also.

H. WILKINSON.

EXPERIMENTS IN DEMONOLOGY.

THE writer has frequently experimented with the trick of the necromancers of old, as mentioned in the paper on the "Genesis of the Camera," of throwing shadows on a cloud of smoke,—substituting for the brazier and the resinous gums of old an old fire-pot and an armful of dampened straw,—with results both startling and amazing to strangers present. In performing the experiment it is necessary to select a still, dark night, when there is no wind, or the smoke will not rise in a steady column. A night when the barometer is low and the sky overcast is the most favorable for the experiment.

Moonlight interferes with the success of the operation,—this is why the necromancers of old always selected the dark moon for their incantations.

To perform this experiment successfully it is best to measure beforehand the distance of the focus of the lantern, and thus find the distance the fire-pot is to be placed from the concealed lantern; it saves trouble, and adds to the mystification of strangers present if they do not see the lantern. The writer has frequently placed his lantern in a bay-window, and after his visitors were placed in the shadow of the bay, and all being in readiness, the sash was quietly raised, the cap removed, and the spooks never failed to materialize promptly. The views used on these occasions were photographic slides of monkey subjects, and as the image swayed to and fro, seeming to rise from the cloud of smoke, it was an easy stretch of imagination to know what the effect must have been on the spectator when the exhibition was performed with all the surroundings and mummery of the necromancer of old.

The main thing to assure success in this experiment is that the smoke rolls up in a dense mass. The denser the smoke the better the screen, and the more perfect the projected images. Care must also be taken that the straw does not blaze up, as a flame affects the clearness of the picture.

Before passing this subject, the writer will relate a personal experience while performing his experiments. The frequent smoke and smell of burning straw caused more or less inquiry in the vicinity of his home. On the night in question two farm hands, determined to investigate the matter and find out what it all meant, quietly crept into the shadow of the bay-window before mentioned. Their presence, however, was detected. As soon as the smoke was dense enough, the sash was silently raised, and the cap removed. The slide selected for their edification was a large ourang-outang. As the simian appeared in the smoke the two spectators, being unprepared for the operation, were at first paralyzed with fear, supposing it was a demon that had arisen before them. Then there was a simultaneous shriek, and the two investigators broke for the road as fast as their legs could carry them; since which time nothing can induce them to re-enter the grounds after nightfall, or can convince their minds that they had not seen a denizen of the lower world. Argument and reason is all in vain,—they holding to their idea that what their eyes had seen they could believe.

JULIUS F. SACHSE.

Leopard, Pa.

SOME REMARKS ON SILVER PRINTING.

IT is not expected that I should give your readers anything new upon a subject as old as silver albumen printing. The truth is, I believe the older methods after all the best. I can therefore only give the result of my experience with such formulæ as I have found to work well in practice.

First, as to the paper. Never use any variety but the most approved; for no matter how excellent the negative, or how careful the operator may be, it is impossible to get beautiful prints from mean paper.

Does it not stand to reason that a poor quality of paper must succumb to the ordeal of the chemicals and the numerous washings to which it is subjected?

The albumen paper is salted with a chloride, so that when floated on the sensitising solution there is formed a chloride of silver; therefore an albumen print is a chloride picture, and to a certain extent the strength of the bath employed depends upon the strength of the salting of the paper, so that it is well to learn what relation there is between bath and paper.

A weakly salted albumen requires a weak sensitising bath, whilst a strongly salted paper demands a stronger bath.

It should be remembered that a weak bath feels more the loss of silver taken up by the paper. In practice I make use of the following:

Nitrate silver, 40 grs.
Water, 1 oz.

in cold weather increasing the amount of silver to 50 grains to the ounce.

Always make up a large quantity of solution,—say a gallon or so. A small quantity is soon exhausted, and is more apt to be contaminated with the impurities from the paper.

There ought to be at least two inches in depth of solution in the dish used in floating, and the dish should be large enough to float a whole sheet at once.

There is no necessity for using distilled water. After dissolving the silver, make slightly alkaline by the addition of a drop or two of ammonia, and expose the solution in a bottle to the action of strong sunshine for several hours. The liquid will grow turbid, then the impurities will precipitate in the form of a brown powder; pour off the clear liquid, and filter it.

I have never found any advantage or any disadvantage from adding to the bath nitrate of ammonia or other chemicals, but I always keep my bath just slightly alkaline by the addition of liquor ammonia. The bath should never be decidedly alkaline; the ammonia should never be added in its concentrated form, but always diluted with a little water. The red litmus paper when dipped in the bath should not be speedily restored to the blue color, as this indicates that the percentage of alkali is too great.

Always filter your bath after finishing with the floating, and before you float the first sheet, scum off the surface of the liquid in the flat dish by running a strip of paper over it. Test the bath every now and then to see that it is alkaline.

A stock solution of silver should be kept to strengthen the bath from time to time.

Be sure to keep all the dishes thoroughly clean, and before using rinse out well.

Floating the paper is of course a matter of practice. Some prefer drawing the sheet after sensitising over a glass rod, but I merely hang up the paper so that the silver shall drain off at one corner, using a blotting pad to absorb the droppings.

The paper to be floated should not be hard or dry. If so, it should be exposed to a damp atmosphere some hours before sensitising. The time of floating depends upon the strength of the bath, as well as upon its temperature.

A minute and a half will generally be found sufficient.

In practice it is best to rub on the surface of the albumen with a canton flannel pad to destroy, as they say, the fungous growth on the surface. Whether the fungus is thus destroyed I cannot say, but the fact is the paper so treated takes up the silver better, and there is less liability to "tears."

After the paper has been well drained, remove it to a warm room to dry as quickly as possible. The next operation is the fuming. For this purpose a box should be had of sufficient size to hold a number of frames, to which, on each side, the paper is fastened by means of clips. These frames should be so arranged in the box that the fumes of the ammonia shall be equally distributed. A false bottom pierced with holes allows the fumes to ascend. Fuming should be continued for half an hour.

The operation of printing nowadays requires a good deal more study than when the wet plate negative was used. To say nothing of the peculiarities of the gelatine negative, that at times may look perfection and yet disappoint us in the resulting prints it gives, there is the host of negatives of all sorts made by every grade of amateurs, and from which one is expected always to produce beautiful, crisp, vigorous prints, or else be looked upon as wanting in skill.

So much does depend upon the negative that it should not be too thin or too intense. With these negatives the aim should be to get as much contrast in the prints as possible, while with intense negatives the contrast should be kept down. A thin negative is not always a weak one, and judicious printing often gives excellent results, because the negative, though apparently thin, is possessed of an abundance of delicate half-tones in the shadows, combined with softness of the high-lights, and if these gradations are not burned out by rapid, careless printing, the result often astonishes us.

A thin negative should always be printed under tissue, and if it is very weak it is well to make the sensitizing bath stronger and give a little extra fuming. Intense negatives, especially those in which the drapery is white, give very harsh, unpleasant results in the prints. Various plans have been suggested for getting less contrast, such as pasting tissue paper on the negative with the parts over the intense portions cut out or coating with colored collodion on the back, and scraping away the film where the action of the light is most needed.

A few words in conclusion. I have frequently noticed that amateurs examine the prints too long when trying to judge of the proper degree of printing; the result is the print is often overcast in the high-lights and made flat. The beginner should always take the frame in the dark room to examine the progress of the printing. It is only by experience that the professional is able to judge by a hasty glance.

JOHN FLEMMING.

Philadelphia.

THE NATURAL IN PHOTOGRAPHY.

AS the question of the natural in photography just now affords a rather prominent subject of discussion, I ask your permission to submit a few ideas which have occurred to me in reference to it. The controversy seems likely to wander into a transcendental region, where ordinary mortals like myself can only follow it unsatisfied and unconvinced, and where, though the aspirations are commendably high, they are apt to become unreachable and unreal, and consequently unpractical and false. I am aware that angels might well fear to tread the ground where some of the writers are dealing such slashing blows, and it is therefore with some trepidation that I venture to put pen to paper for the purpose of endeavoring to put things in a common-sense light, and asserting the *quid pro quo*.

First of all let us bear in mind that the subject of the controversy is *Photography*, a new science, the capabilities of which some of us are trying to turn to account, so that we may produce natural and pleasing representations of what we see with our eyes. To discover how far photography can aid us in accomplishing this desirable end is the task we have set before us, which we must approach first and foremost from a naturalistic point of view. I have neither the desire nor the ability to discuss the subject scientifically, I only intend to deal with it as the teachings of nature guide and instruct me.

The limitations in art photography—those inherent to it—are many; quite serious enough without burdening ourselves to begin with by the limitations to which the painter is subject. There is no question that photography has taught and is teaching the painter a great deal, and it will not be matter of surprise if it brings about large modifications in his conventionalities and his modes of dealing with nature. If the photographer had lived before the painter, how different might have been the painting!

But I urge, again, it is photography we are considering. As the saying is, "Let every tub stand on its own bottom." We shall find that photography has a bottom broad and solid enough to stand upon without being propped up by extraneous aids. It has gone through the stages of birth, crawling, toddling, ambling, and has now arrived at the stage of robustness.

There is some fear of its assuming the strutting stage by aping artists and their conventionalities, and otherwise getting outside of its proper and legitimate sphere. Let us, by all means, study how painters achieve success, how they translate nature, how they put soul into their work, and let us do what we can in the same direction consistently with the tools at our command and the many other differing considerations and conditions of our handicraft. Let us not, however, stick feathers about our sombre bird, and call it a peacock!

But to come to limitations. In considering how much to include in a picture, what amount of angle,—say in a landscape,—let us see what limitations Nature has put around us. It will be conceded that we all have, or ought to have, two eyes; that it is necessary, in order to see properly what is before us, that the two eyes shall see it simultaneously; and further, that we also have a nose. Now it is a fact that may not have struck all of us, that the nose is the feature that limits our angle of

view, and forms the margin of what we see sidewise. Shut the right eye, and with the other look to the right: the nose will cut off the view in that direction, and form the right limit to the view in front of you. Shut the left eye and look to the left, and a corresponding limitation of the view in that direction will result. Upwards, the eyebrows will form the limitation.

All the view within these limits can be seen easily at once, and without effort, by moving the eyes about, keeping the head still. The angle will be, with normal eyes and nose and eyebrows, about 75 degrees. But this must, of course, vary very much with different people. Some, with eyes projecting and flat surroundings, embrace a wider angle with their two eyes. Others, with eyes close together and deeply sunk, will have the angle of view much restricted, to the extent of several degrees. A projecting nose will give the same result; and let me remark, in parenthesis, that this may perhaps supply a reasonable excuse for those of us who object to the use of lenses including more than a certain angle,—their natural vision is too limited.

Nature has adapted our eyes and our nose and our eyebrows to take in an angle of vision that is useful and convenient sidewise and upwards; she would probably have drawn the limits downwards closer by projecting the cheek bones more prominently, were it not that we want them out of the way to see where we are going.

I don't see how it can be contended that any quantity of landscape or view that is included within the limits of vision by the two eyes at once is not a normal and natural one; nor would such a contention be possible but for our conventional and unnatural teaching. How hard the lens makers tried to induce us to believe everything unnatural that was outside what they had to supply us with! We are at liberty, however, in our picture-making to restrict our attention and our pictures to anything within the limits I have given, from the wide, wide sea to a beetle's eye.

In considering the question of sharpness or definition on the one hand, and diffusion, or, to use the expressive word, "fuzziness," on the other, let us start from the standpoint, Nature.

Irrespective of all other considerations—*e.g.*, how painters do it, and have been doing it, or how we have been educated or mis-educated to like it—let us inquire what we really do see when a landscape is before us and we open our eyes to examine it. Glancing rapidly over the area within the limitations of vision, we receive a general impression of the view; we see nothing in detail or sharply defined at first sight, nor do we want to; there is the landscape, and it pleases us. Neither, on the other hand, is there any diffusion, nor is there, nor does there appear, any fuzziness. Arrest the eyes for a second, and let them settle on any one portion of the view within the limits referred to (be it in the middle or at the margin of the landscape), and it will at once appear sharply focused and distinctly defined. I ask any one whose eyes and judgment are not prejudiced to examine carefully, with a view to his recording his optical impressions, the next landscape he sees, whether it be in the city or the country. Look at that omnibus driving through London twenty yards away, and the driver on it; how much of the general landscape can you see while you remain looking at his face? You can form only an imperfect idea of the scene he is driving through, unless you remove your eyes from him, or strain your eyes and try to get an idea of the surroundings without actually taking your eyes off him; and the moment you do this the sharp definition of the face is gone. Be you a draughts-

man never so clever, try and depict the landscape (included within, say, an angle of 60 degrees) while you look on the principal or central point, what would be the result? Chaos would be orderly and serene compared with it. Is it not precisely the same when we look at a photograph, or, for that, any pictorial representation, only that it is on a reduced scale? Is not a corresponding effort of eyesight (only on this reduced scale) required to take in all that is contained within its limits as is necessary for the actual landscape?

In an ordinary landscape the eyes will adapt themselves to the various planes without any apparent effort, a normal sight probably first taking in those at a distance, which go to make up the greater part of the view, conscious all the while of the objects on the nearer plane, but not altering the focus until the others are for the time done with. Where, however, the subject of the picture is in the immediate foreground, with a distant background, but no middle distance connecting it, the sight will have to make a distinct, if scarcely perceptible, leap.

Now, a photograph of a landscape will represent it as a map drawn to a very reduced scale. As the landscape comprised an angle of about 60 degrees, whilst the photograph is included (as seen with a normal sight) within about half that angle, it is clear that, to see the photograph aright, even the small effort required to see the landscape will be very much diminished. To illustrate this portion of the subject more completely, let us suppose we have a photograph with a blur (call it diffusion if wished), only just appreciable to the sight, of some particular feature. Now turn to the landscape, and imagine the blur introduced into the actual view, and enlarged to the full extent as depicted in the photograph,—what would it look like? Like anything we had ever seen in nature before? Unless our eyesight had become suddenly deranged, we might wish ourselves in another hemisphere, for nothing short of an earthquake would produce such a distortion. But we ought to be considerate, and remember that there are eyes and eyes—short-sighted, long-sighted, and otherwise imperfect, to which a landscape may always appear fuzzy, or without extraneous help possessing at least a certain amount of softness or diffusion; but we are not, surely, to make our pictures unnatural to meet the defect of imperfect eyesight.

In selecting a view with a central dominant feature in it, the picture may be made or marred by the surroundings within its limits, or, in other words, its setting. In the landscape our eyes need not necessarily be focused upon this setting, unless it lends itself and leads up to the dominant feature of the picture, or to our subject. But if we do turn our eyes to examine it—and to see it we must do so—we shall certainly find nothing blurred or fuzzy. It may nevertheless happen, for the sake of picture-making, that we do not want to make too minute an acquaintance with our setting, as the quantity of conspicuous detail may detract from the feature of primary interest; so we let the eyes wander round for a brief glance, and come back with satisfaction to our subject. If there be, besides, a conspicuously obtrusively object within the limits of our view we have made a mistake in selecting it for photographing. But there may be details countless of a less obtrusive character, each and all of which will be clear and sharp when looked at; and these may be rendered in the photograph equally sharp without detracting from the central interest. If we have selected a proper subject, and have studied it aright, we shall see that these details can be dealt with in the management and making of our negative, in its exposure and

development. There is a way of doing this by which subordinate detail will stand out as prominently as the principal subject, but there is also a way by which skilful treatment will modify and subdue obtrusive detail, render it harmonious, and give to it its relative value in the picture.

To select such subjects for our picture—if we be ambitious enough to aspire to art-photography—as can be rendered easily and readily by the means we have at hand,—this should be our aim; not a vague and unnatural indistinctness at once meaningless and unsatisfying.

I have worked long enough at our difficult and beautiful art to be aware of its shortcomings, and to feel that, bereft of the magic charm of color, it still stands a step below the sister art, just as the highest effort of the painter must give place to the actual scene itself, with its ever-shifting light and shade and shadow, and distant blue in the trembling air. How far the researches of science may hereafter help us to overcome deficiences and difficulties, and what possibilities may lie hidden for us in the future, we cannot tell. But of this I am quite certain,—they are not to be attained all at once by the simple expedient of giving the lens a screw—the wrong way.

J. GALE, *The Amateur Photographer.*

URANIUM-GOLD PRINTING.

THE following is a description of an original method of printing from the negative that is at once simple, pleasing, and inexpensive. As it is by ferric agency that the "place is prepared" for the reception of the compound that forms the ultimate image, the process may reasonably be termed an "iron" one. The few details here presented take no claim to be considered exhaustive, and should rather be regarded as designed to elicit the ideas and attract the experiments of others.

The *rationale* of the process may be thus stated:—Suppose paper coated with ferric oxalate to be exposed to light behind a negative, there is formed a positive impression, chiefly in ferrous oxalate, which will easily reduce and be replaced by certain metallic compounds, as, for instance, gold and silver, and probably others. Thus we can obtain silver pictures by direct chemical substitution, as well as by printing out in the chloride or development. Among the important compounds that ferrous oxalate is powerless to reduce may be classed those of uranium. But if to a per-salt of this metal in solution there is added a small quantity of gold chloride, and the combined solution is washed over the ferrous picture, a ready deposition takes place. The gold, while being itself thrown down, carries the uranium with it, and becomes intimately united therewith to form the final positive image. The portions of the picture that were not affected by light have no reaction with the "developing" solution, and are thereby dissolved away, leaving only a surface of plain paper.

In the practical working of this method of printing the following are to be provided:—Paper coated with ferric oxalate, nitrate of uranium, chloride of gold, hydrochloric acid.

Iron per-oxalate is employed in several processes, but as the greater number of persons who handle it are ignorant of the facility with which it may be prepared, a

convenient method of making a small quantity due to Pizzighelli and Hubl is subjoined.

Dissolve two hundred grains of per-chloride of iron in four ounces of water, heat to boiling point and add hydrate of sodium—about one hundred grains will be required—until an alkaline reaction is indicated. Wash the precipitate with warm water, and when it is neutral to test paper, free it from nearly all the water by squeezing it in a clean piece of linen. The reddish-brown mass of ferric hydrate should now be placed in a flask, or other suitable vessel, about a hundred grains of oxalic acid added to it, and the vessel set aside in the dark for two or three days. The greenish-brown solution of ferric oxalate obtained at the end of that time should be filtered, and the amount of acid and iron therein contained determined by analysis. The solution should exhibit a decided acid reaction; if such is not the case a few crystals of oxalic acid are to be added. The solution is unstable, hence it is advisable to prepare more than sufficient for immediate needs.

The quantity of sensitive solution to be taken for coating the paper should be in the proportion of one grain of ferric oxalate to each square inch of surface. The sensitized paper will not deteriorate for several weeks if shielded from damp and light; if it is desired to preserve it for longer periods, the addition of a grain of mercuric chloride to each ounce of ferric solution before coating the paper is said to exercise a preservative effect.

When the dried iron paper has been exposed in contact with the negative, and the characteristic ferrous image obtained, it should be floated upon a solution compounded in the following proportions:—

Nitrate of uranium	15 grains.
Chloride of gold	1 grain.
Water	1 ounce.

After the desired depth of deposition has been obtained the picture should be passed through plain water, followed by immersion in dilute hydrochloric acid, 1 : 100, again treated with water, and finally allowed to dry.

The tone of the picture should be deep blue-black, and the image should not be deficient in vigor and balance. The proportions of the salts given above may be varied largely: the addition of more gold insures a corresponding increase of the purplish element in the color of the print; its diminution tends to the predominance of the cold black of deposited uranium. The greater the quantity of gold taken the more rapid will the reduction proceed. The appreciation of the points immediately enumerated will place in the hands of the experimentalist every power to modify the color of the picture, and to restrain or accelerate development.

As nitrate of uranium may be purchased at a lower rate than the silver salt, and the quantity of gold employed need not, on the whole, exceed the average taken for toning albuminate of silver prints, the comparative cost of the little process I have sketched could be ascertained without difficulty: I do not think it would exceed that of any silver process at present in favor.

THOMAS BEDDING in *British Journal of Photography.*

EXPERIMENTS WITH BROMIDE PRINTS.

(*A Communication to the Photographic Club.*)

YOU will no doubt remember that at a meeting of our club the question of reducing bromide prints by treatment with old oxalate developer, followed by immersion in the fixing bath, was raised. The discussion originated from an experiment witnessed at the Eastman Company's place, and several members stated that they had tried the process, some of them without success.

Mr. Bridge has kindly sent me some deeply printed bromide enlargements, with a request to investigate the subject.

I now beg to lay before you the results of the experiments which I have made, and at the same time to submit the prints which I have treated by the process under consideration.

The case in point may be stated as follows:—A finished bromide print is immersed in some old oxalate developer; it is then transferred to the ordinary fixing bath.

Does it suffer any reduction under this treatment?

I think it will be best to describe, first of all, the solutions used in the experiments.

Developer.—This had been long in stock and had been already used for developing several prints. It had been kept in a closely stoppered bottle, and was perfectly bright and clear. The color was a bright yellow, and at the bottom of the bottle was a small quantity of the well-known green crystals. Tested with litmus paper it was found to be very faintly acid.

Hyposulphite solution.—This was freshly made, and consisted of three ounces of the salt to one pint of water. A piece was cut out of one of the prints so as to embody both dark and light parts, and was then soaked for some time in clear water. It was then well drained and flooded with the developer for five minutes. After being drained again, it was transferred without washing to the fixing bath. So as to make the experiments under similar conditions, each print treated was left in the hyposulphite for fifteen minutes, this being, I believe, the average time allowed for the fixing of bromide prints. The dish was rocked from time to time.

A very perceptible reduction took place, as you can see by comparing the cut piece with the original print. There is also a modification in the color of the print. The same process was repeated with another piece of the same print, the old developer being rendered acid by the addition of a few drops of acetic acid. As you can see, there is not much difference either in the amount of reduction or in the tone of the pieces treated by either process. Half of this portrait was flooded with the acid developer and fixed as above. Here, again, we have reduction, but there is also a very considerable amount of yellow stain. I did not attempt to remove the stain, as this might, even if successful, alter the tone of the print and make it less comparable with the others.

I next soaked a print in water, and blotted off the excess after the paper had become thoroughly limp. I painted over part of the picture with acid developer to see whether I could reduce it locally. I found some difficulty in getting the developer to take on the gelatine surface. The reduction is not very considerable, but is still

perceptible. The action is not energetic, on account, probably, of the small amount of developer which the gelatine is capable of retaining. I have indicated the part of the picture acted upon by a line in pencil.

It seemed probable that a fixing bath which had been used for several prints might exert a reducing effect on pictures fixed subsequently. In order to test this I submitted part of a print for fifteen minutes to the action of the hyposulphite. Both fragments of the print were then washed together in the usual way, so that any alteration in tone which might be due to prolonged soaking should be put aside. You will notice a certain alteration in the part of the print treated by the contaminated hyposulphite. I then added one ounce of the old developer as above to the twenty hyposulphite solution, and placed in the mixed bath a piece of a print; the reduction was rapid, and at the end of fifteen minutes the result is what you can see by comparing the tone of the reduced piece to the remainder of the picture.

As it is highly probable that the reducing effects observed are due to the presence of ferric salt in the old developer, I made a half per cent. solution of ferric chloride and immersed a piece of a print in it for five minutes. After placing it for fifteen minutes in the fixing bath the image had faded considerably, and there is no doubt that by repeating the process it could have been made to disappear almost completely. I have here two prints from the same negative, done on Anthony's bromide paper. The developer was compounded by mixing one part of iron with nine parts of oxalate solution, a trace of bromide being added. Fresh developer was used for each print, and both were washed in three acetic acid baths, and then in several changes of plain water. They were then fixed for about twenty minutes in a freshly made hyposulphite solution (three ounces to the pint). When finished they were very nearly identical in depth, and had the same amount of detail. After washing the prints thoroughly, one was partially dried and half immersed in the solution which had been used to develop it. After fifteen minutes of renewed fixing the immersed part had considerably faded. On examining the print you will notice how much of the detail has disappeared, and also that in places the faded image is replaced by a yellow stain effecting the same shape as the detail which has been reduced.

From this result it would appear that the action is very powerful, as but little ferric salt would be formed in the developer after the production of one print. At all events, the necessity for careful washing after development becomes apparent, and I think I may add that the same ought to be done after clearing with acid.

A few years ago I published, in collaboration with Professor W. Spring, of Liége, a research on the acids of the thionic series,* We found that when dilute sulphuric acid is added to a solution of hyposulphite of sodium a certain amount of sulphuretted hydrogen is evolved at first, and trithionic acid is formed. If the addition of acid is continued, sulphurous anhydride comes off, as is well known.

I mention this fact here, as there might be a possibility of either of the gases indicated having some influence on the print.

ADOLPHE M. LEVY.

* Recherches sur les Acides Tetra- et Trithioniques. W. Spring & A. Levy. Bulletin de l'Academie Royale de Belgique, deuxiéme Série, t. XLII., No. 7. Juillet, 1876.

DAYLIGHT UNDER WATER.

M. HERMANN FOL reports to the Académie des Sciences the result of the researches that he has been making in the depths of the Mediterranean during the summer months, his object having been to certify how far daylight penetrates. His operations have been carried on in water of remarkable clearness between Corsica and the shores of the Alpes-Maritimes, at a distance of eighteen geographical miles from the nearest land. M. Fol used a gelatino-bromide plate exposed during ten minutes, whereby he has found the limit of daylight in those waters to be at a depth of 1518 feet—465 metres. This is 327 feet short of the limit assigned to daylight in the Mediterranean by the Germans, Chun and Petersen, some years ago. —*Engineer.*

LORD RAYLEIGH, in a contribution on "Pin-Hole Photography," to the British Association, gave mathematical formulæ to get the true focal distances for distant effects. A photograph of a weathercock was shown which required to be held nine feet from the observer to get a proper view of the picture. Captain Abney pointed to the advantage of a knowledge of this pin-hole photography, and said that on one occasion in India he went seven hundred miles up country to photograph some temples. He found that he had forgotten his lens, but by using a fairly big-sized pin-hole, and giving a long exposure, he got his photographs. He knew two ladies who used the tin of a cocoa can, making the pin-hole with a fastener from one of their hats.—*Engineer.*

A CHEMICAL BALLET.

AT a banquet which was given at the conclusion of the German Congress of Naturalists and Physicians at Cologne, Dr. Hoffman alluded to the difficulty experienced by students in understanding the constitution of organic compounds, and suggested an original method of fixing these in their minds.

The audience was then treated to a ballet in which the dancers were dressed in different colors, to represent the various atoms.

At his command these colored female atoms grouped themselves in various fashions to show the chemical constitution of particular compounds, and their reactions.

The composition of benzole, and the formation of aniline and its derivatives, were particularly applauded. The ballet wound up by a representation of the formula for roburite, the new explosive,—the finale being a formidable explosion.—*Annals of Hygiene.*

DURING the months past we have experienced great pleasure in noting the interest taken in the AMERICAN JOURNAL OF PHOTOGRAPHY, and have been greatly encouraged in our labors by the receipt of many kindly letters from abroad as well as home, in which the magazine is spoken of in the most favorable terms, as giving help and information. Besides we have a most substantial evidence of the appreciation in which it is held, and of our endeavors to keep it at the high standard it has attained, from our greatly increased subscription list. Now it is our intention to add still more to the number of our readers by furnishing them with the most valuable

information on all topics relative to photography. Being practical workers, we understand their requirements, and know what is of special interest to them.

We shall present many valuable papers during 1890, from the pens of active workers in the profession. Our illustrations shall be of the same good quality by which they have ever been characterized, and many new features shall be added, so as to make the AMERICAN JOURNAL OF PHOTOGRAPHY the best possible photographic magazine. Our subscription price will remain the same.

Give us your support by sending the renewal of your subscription.

M. CAREY LEA advocates the use of yellow-green light for dark-room illumination. Not only does it afford better illumination than the ruby light, but it also is less irritating to the eyes.

In many of our developing rooms, we have found that yellow light is taking the place of the ruby, even where very sensitive plates are exposed. The sodium lamp, which gives a pure yellow blaze, and considerable illuminating power, has been found to be perfectly safe, and far more pleasant than the old argand burner with the red chimney.

BUFFALO, October 29th, 1889.

Editor AMERICAN JOURNAL OF PHOTOGRAPHY:

The Executive Committee for 1890 requests me to announce officially that they have chosen Tennyson's poem, "Enoch Arden," as the subject for competition for the Grand Prizes.

The rules governing the collection of photographs will be the same as this year for "Evangeline."

They have made the selection thus early that those who intend to compete may have ample time to work up the subject.

H. MCMICHAEL.

A BOOK recently published by Gauthier-Villars, of Paris, gives a description of a very ingenious but simple apparatus for making panoramic views by photography. It is called the Cylindrograph, and is the invention of M. Moessard, a professor of typography at St. Cyr.

As far back as 1865, Johnson of England constructed a camera for this purpose, in which clock-work was employed, but the device of M. Moessard is simplicity itself, being entirely without mechanism so-called. It differs from all others in having the sensitive surface stationary, while the lens is made to move. The impression is received upon a flexible film bent to a curve the radius of which is equal to the focus of the lens. The lens can be moved backward and forward between the extreme limits of the view, so that the panorama is made, as it were, piecemeal,—a stop in front of the lens cutting off all but a very small portion of the view. These separate portions may receive different exposures, so that the operator can give more or less time according to the degree required for each.

MR. T. H. STEBBINS, at a recent meeting of the Society of Amateur Photographers of New York, made an important communication on certain organic reducing agents as developers. Among other reducers, he described the amido-beta-

naphthol-beta-sulphonic acid, a compound obtained by reducing the orange dye stuff produced by combining diazobenzo-chloride with Schaffer's beta-napthol-beta-sulphonic acid. He describes it as consisting of little white crystals soluble in small quantities in boiling water without decomposition, and in alkaline solutions behaving similarly to alkaline pyro-gallol—like the reducing silver salts to metallic silver.

The identity of this reducer with the new developer eikonogen is now well known, and the credit is certainly due to Mr. Stebbins as the first in the country to suggest its employment as a developing agent.

Mr. Stebbins says: "At the time I first brought this subject before your Society, my manuscript was not completed, and illness, shortly afterwards intervening, has prevented me from completing it till recently. A few days since, upon my return from the country, where I had gone to recuperate, my attention was called to a new developing reagent known as "eikonogen." Imagine my surprise when I learned that this new compound was nothing more nor less than amido-beta-naphthol-beta-sulphonic acid, which I described in the early part of this paper, over three months ago. I do not know to whom the priority of this discovery is due, or even whether it is patented; but, as I was the first to suggest its use as a developer in this country, I think I am entitled to some recognition for the same.

CAPTAIN ABNEY ON HELIOCHROMY.

(*Reprinted from the Journal of the Franklin Institute, Nov., 1889.*)

CAPTAIN ABNEY, in a recent address before a section of the British Association,* made some brief remarks upon the subject of heliochromy, which are, in my opinion, so misleading as to call for correction. I quote as follows:

"The nearest approach to success in producing colored pictures by light alone is the method of taking three negatives of the same subject through different colored glasses, complementary to the three color-sensations, which together give to the eye the sensation of white light. The method is open to objection on account of the impure color of the glasses used. If a device could be adopted whereby only those three parts of the spectrum could be severally used which form the color-sensations the method would be more perfect than it is at present. Even then, perfection could not be attained, owing to a defect which is inherent in photography. This defect is the imperfect representation of gradation in tone."

According to those recent text-books on color which I have seen, only such light rays as are supposed to affect only one kind of nerve fibrils in the eyes, or to excite only one of the fundamental color-sensations, can be said to form or represent primary color-sensations, and such rays are confined to both ends and a narrow strip in the middle of the visible spectrum.† If Captain Abney

* Reprinted in the *Scientific American Supplement*, Oct. 5, 1889, p. 11,472.

† "Helmholtz, Maxwell, and Rood, as well as many other physicists, have developed the theory of Wunsch and Young, and have adopted the same, or very nearly the same, trial of primary color-sensations. These fundamental hues or primaries * * represent three widely separated and very bright colors of the spectrum."—*Color*, by A. H. Church, M.A., London, 1887, p. 67. See also Rood's *Modern Chromatics*, pp. 120-23.

means to assert that in a process of this character only those rays of the spectrum should act which represent primary color-sensations, he is certainly mistaken, and grievously misleading all those who accept him as an authority upon this subject.

It is certain that every ray of the visible spectrum should act, and act nearly in proportion to its power to excite the sensation of light in the eye. It would be ridiculous to expect that a process which reproduced the spectrum as three detached and widely separated patches of color would correctly reproduce the infinite variety of compound colors in nature, some of which are made up chiefly, and most of them partly, of rays lying in other parts of the spectrum. There are some moderately bright colors which would reproduce like black by such a process.

But it is not easy for me to believe that Captain Abney means what I have inferred from his statement, although the expressions "parts of the spectrum" and "impure color of the glasses" certainly support this inference. When he says "those parts of the spectrum * * which form the color-sensations," it is possible that he may mean the light rays in proportion as they affect the different kinds of nerve fibrils or excite the different primary color-sensations in the eye. If so, he does not mean to divide the spectrum into three distinct parts, but aimed to state a fact which was first observed by me, and plainly set forth in my book, *A New Principle in Heliochromy*, where I showed that each heliochromic negative must be made by the joint action, in due proportion, of all rays which affect the primary color-sensation which it represents. It does not require screens of "pure color" to do this—quite the contrary. Screens of "pure color" are screens transparent to single regions of the spectrum only, and would not transmit all the rays that affect a single kind of nerve fibrils in the eye. The red, orange, yellow, and yellow-green rays all affect the nerve fibrils which produce the red color-sensation, and all of them must therefore be transmitted more or less freely by the color-screen used in making the negative representing that primary color-sensation. But the orange-yellow and yellow must also be transmitted to some extent by the screen used in making the negative representing the green color-sensation.

The screens must, in short, be so graduated in color as to secure, in negatives of the spectrum, curves of intensity like the curves of a diagram representing the action of the spectrum upon the three kinds of nerve fibrils in the eye, or upon the three fundamental color-sensations; and it is a fact that such screens had been produced and that correct heliochromic negatives had been made in considerable number, and with ease and certainty, before the beginning of this year.

The observation that the inability of photography to exactly represent gradations in tone would affect the accuracy of such a method of reproducing colors, of which Capt. Abney now makes so much, originated with myself; but I also showed that by my method of proving the color-screens by reference to the curves of intensity in the spectrum negatives, the effect of this defect in the negative process could be so far compensated for that it would no longer seriously affect the result, if suitable sensitive plates were employed. To say that this method does not solve the problem because of this defect, would be equivalent to saying that photography has not solved the problem of reproducing light and shade.

F. E. IVES.

LENSES.

[*A Communication to the Birmingham Photographic Society.*]

WE propose having a little talk this evening about photographic lenses. It is comparatively easy to talk without saying anything that is to be profitable, and my difficulty is to tell you something you do not know. But I do hope the discussion I shall endeavor to start will bring out some practical knowledge for diffusion among us. That is my object in accepting my present position. I propose to leave out, as far as circumstances will permit, the theoretical and scientific aspect of the subject, which only interests its few, and treat as well as I am able of the practical side of it,—that is, the knowledge and use of lenses, in which we must *all* be interested. At the same time, I strongly recommend all photographers to learn what they can of the theory and principles of photographic optics, as they will the readier grasp the intentions, capabilities, and use of their lenses. I am not going to attempt much history of lenses either, but will speak of them as I find them.

To commence with, I may perhaps point out where a photographic lens differs from any other. If I take a simple spherical lens, such as a magnifying glass, and attach it to a camera, then turn it to some brilliant object, I see fringes of color around the lights,—prismatic colors, of course. If I take a picture with it I obviously fail to get sharp outlines, besides finding numerous other ills from spherical aberration, etc. Most of these faults were studied and corrected when telescopes came to be made, long before photography was known. The color, or chromatic aberration, as it is termed, was got rid of by making each lens of two kinds of glass cemented together, one counterbalancing the opposite errors of the other, and so telescopes became greatly improved. I have felt obliged to mention the telescope lens because the photographic lens is in a sense the outcome of it. The lens I have now described may show a very satisfactory image upon our ground glass, but attempt to take a picture with it, and you will find it all out of focus. Strange to say, it is found there may be a chemical and a visual focus, and that the two quite differ. I have no doubt Daguerre found this difficulty, and had to ascertain how far to move his focusing screen to get at the chemical focus. A photographic lens has to be corrected to make the two foci coincide, and I mention this chiefly because plenty of lenses are knocking about to-day where this has been very imperfectly performed, much to the detriment of the lens and the mystification of the tyro. We have got as far now as what is called a single lens (the compound of two pieces of glass). It is now so well understood and simplified that I can now pick up a very decent half-plate photographic lens, an unmounted meniscus, that can be bought in quantities at eighteen pence each, quarter-plate a shilling. It is such as you find in cheap cameras, and in skilful hands will produce pictures difficult to distinguish from those produced with expensive lenses. It was observed that these lenses, while giving most excellent results in landscape pictures, when applied to straight lines, such as architecture or machine drawings, gave very decided distortion at the margins. When the stop was at the front of the lens the distortion was barrel-shaped,—that is, coming in at the corners,—while, when the stop was at the back of the lens, the distortion was pincushion-shaped,—that is, extended at the corners. These faults were got rid of by employing two lenses at varying distances apart, with a stop between them.

This form is called rectilinear, and other names with a similar meaning. You will here observe that the stop is in front of one lens and behind the other; this may be why one corrects the other, though I have never observed it in print.

The two lenses forming the combination are often exactly alike, hence the term symmetrical. This form of lens gives us straight lines, hence the term rectilinear. But it has another advantage also, it admits of a larger stop than a single one does to attain the same depth of focus; though for all its advantages it is frequently inferior to the simple single lens in producing pictorial effect. A portrait lens is one of this combination form, working with extra large aperture, often *f*-4, but it is not a symmetrical,—the two lenses are quite different. A wide-angle lens is also a similar form, but to make it cover a plate large in proportion to its focus the lenses are placed together, and a smaller stop becomes necessary to give depth of focus, so that wide-angle lenses are not so quick as the ordinary rectilinear, seldom working above *f*-11. However, they are often indispensable for working at short distances, which they do by virtue of their short focus; but as they give an exaggerated appearance to perspective they should never be used when a long-focus lens would do the work. To those who, have never done so it is worth while to note what angle means in respect to lens. I will attempt an illustration on a half-plate. From corner to corner a half-plate measures about eight inches. Many of you possess half-plate lenses of eight inches focus; now we will see what angle they include. If I draw a line from two extremities of our plate to the lens, so, and now note how many degrees of the circle that includes, we have the answer. There are 360 degrees in the circle, and as our diagram shows us a segment exactly one-eighth of a circle, the angle of lens is forty-five, which is practically an admirable one. The widest angle lens I have yet met with is four inches focus to the half-plate; we shall find its diagram shows just a quarter of a circle, which is, of course, 90°. Wide-angle lenses are usually about 70° to 80°, which would be about five to six inches focus for the half-plate. The angle of a lens has a very direct bearing upon the artistic side of the question; the nearer it assimilates to our own eyes, the truer the effect. I hope we shall hear something about this in the discussion.

And now a few words about stops and diaphragms. Lenses without stops are like heads without brains—you can do very little with them. A stop has various effects upon a lens, mostly beneficial, though I don't wish to convey the impression that the more stop the better, else the cap would be the millennium; on the contrary, I would rather say the larger or the less stopping the better. The margin of a lens is of necessity more inclined to faults than the centre, and a stop acts beneficially in interfering with those faulty rays. It does not effect this by cutting them off, else the same thing might be done by reducing the diameter of the lens itself; but a stop properly placed turns the rays "in the way they should go," and that is sufficient for us to-night. True, stopping down diminishes the light, which is generally the reason for using the largest stop you can. Undue stopping down also makes detail too sharp for most artistic senses. The position of the stop should invariably be determined by the lens maker, and if found to be at fault—such as giving flare spot—should be returned to that individual for correction. Stops are, or should be, marked *f* so-and-so. For the benefit of those who may not understand the exact significance of those marks I will explain it.

The figure on the stop refers to the diameter of the aperture in relation to the

focus of the lens; thus, if we take our half-plate eight inches focus rectilinear and look at the largest stop, we find it marked *f*-8, and on applying a foot rule find that the aperture measures one inch, so that *f*-8 means an aperture one-eighth of the focus of the lens. If you look at the *f*-16 stop, you will find that it measures half an inch, or one sixteenth of the focus length. The great value of this notation is that, practically speaking, *f*-16, or any figure on one lens, requires the same exposure as the same figure on any other lens, thus giving us a ready means of comparing and adjusting over-exposures. Theory also steps in and says that as you increase or diminish the stop the amount of light admitted amounts to the square of the difference, or, in plain language, *f*-8 being twice the diameter of *f*-16, only requires one-fourth of the exposure, or *f*-32, being only half the diameter, requires four times the exposure. In practice I have found that *f*-32 would be over-exposed with four times the exposure of *f*-16, but we must not rush off to blame theory for that—no doubt the philosophers are right in the main, but there are often disturbing influences. I want to know whether anyone else has observed the same thing.

Before concluding, I would say that there are several modifications of the foregoing lenses being made now, such as a single lens with a comparatively wide angle, and a symmetrical doublet working with as large an aperture as *f*-6, the Euryscope. These lenses are invaluable for special purposes, but are not so universal as the others. I have a triplet lens here; this lens is an arrangement of three achromatics, all of different sizes and focus; it is perfectly rectilinear, and a splendid lens for most purposes, copying in particular, but it has one great drawback to modern ideas—it is very slow. It dates much earlier than the rectilinear you are so familiar with, and in its day was the best lens to be had.

During the last year or so quite a flutter has been caused among us by the discovery of an entirely new glass, known as "Jena." It places quite a new power in the hands of the optician, and great things have been prophesied. Whatever it may be destined to become, we have not heard of it lately, and I have not yet seen a specimen myself. I think we are now ready to look for the "moral," and seek an answer to the question, "What lens shall I buy?" That is a very awkward question to be asked. If we are asked, "What *lenses* shall I buy?" the answer is comparatively easy. We have got into the subject sufficiently to-night to see that to satisfactorily accomplish all-round work several lenses are wanted, and, as a matter of fact, professional and all amateurs who can command them employ several lenses to their cameras.

The usual, and I've no doubt the best, advice to the one-lens man is to buy a rapid rectilinear, or one of the same class, for I should like to be understood that there are at least half a dozen first-class makers turning out a similar lens, and the qualities of all are so much alike that it takes a much cleverer man than I am to detect the difference. The young beginner with a cheap set invariably has only the single lens to work with, but while he sticks to ordinary landscape or groups, his disadvantage is far more imaginary than real. I have necessarily only been able to give a rough outline of my subject, but if its scantiness enables you to commit it the more surely to memory, my efforts will not have been in vain. It is the desire now that you should ask and raise questions, and what I cannot answer others amongst us may. I look forward to the discussion so raised being of more value than my little paper.

WALTER GRIFFITHS.

THE PHOTOGRAPHIC SOCIETY OF PHILADELPHIA.

A STATED meeting was held on Wednesday evening, November 6th, 1889, the president, Mr. Frederic Graff, in the chair.

The Secretary reported that at the Conversational Meeting, October 16th, Mr. Milburn, of the Eastman Dry Plate and Film Company, exhibited before the Society the new Eastman Transparent Films, and gave a practical demonstration of their use and development.

The film consists of an exceedingly thin and transparent support, coated with a highly sensitive gelatine emulsion. One of the chief characteristics of the film is its flexibility, which adapts it for use on roll holders in the same manner as the company's old film in which paper was the support. It has the further great advantage, however, that no stripping, oiling or other after processes are necessary; it being treated in all respects practically like a glass plate. After the final washing it is soaked for a few moments in a special solution of glycerine, alcohol and water, which prevents its curling or cockling in drying. It is then pinned up on any perpendicular surface to dry.

The Committee on Membership reported the election of the following active members: Philip F. Fulmer, jr., Stephen Minot Pitman.

Mr. Walmsley showed Eastman's Kodak Camera, No. 2. This little box is precisely the same in outward appearance as the well-known Kodak that has been before the public during the past year; differing from it only in size. The older form makes a picture 2⅝ inches in diameter; the new one, or No. 2, 3½ inches. The lens has a fixed focus, all subjects for five feet distance being sharply delineated. It has also a diaphragm shutter, easily rotated, which gives three (3) sizes of openings, thus greatly increasing the efficiency of the instrument in time work on interiors, etc., and also where great excess of lighting prevails, as in seashore views, etc. The Camera is loaded with the new "Transparent Film" for 100 exposures, requiring no stripping and being treated in all respects the same as a glass plate. A view finder is attached to the front of this camera, enabling the operator to see what he exposes upon at the moment of so doing. Mr. Walmsley also exhibited a number of negatives, made from his own exposures with this camera, as well as prints and lantern slides for same, all of which showed great capacity in the camera and lens.

A fine view camera, using 5x7 plates, and made also by the Eastman Company at their London works, was also shown by Mr. Walmsley. This camera and its accessories combine the most recent advances in this direction, regardless of labor or cost, and in all respects seem suited to the requirements of the most exacting demand. The entire outfit, consisting of camera and three plate holders, was made of the finest Spanish mahogany: the box itself folding with a thickness of one and a half inches when closed. At the same time the perfectly rigid bed was capable of sufficient extension to admit the use of a lens of nineteen inches focus. By an ingenious arrangement, the back could be advanced toward the front, so as to permit the use of wide angle lenses of very short foci, without including the bed plate in the field of view, as is the case with all cameras in which only the front can be moved to and fro. A *single swing back* only is provided; but the *front* is so constructed as to per-

mit of a very wide lateral swing to same, whilst the rising and falling front has a very wide limit of adjustment. The back is reversible for horizontal or vertical exposures. The bellows are of fine leather, cone shaped. The folding tripod legs are attached directly to the base box of the camera by a revolving brass carrier, and both back and front are provided with automatically moving pendulum arms for leveling the camera. The focusing is effected by a finely cut rack and pinion, controlled by large drilled heads, and the entire workmanship is the best that London's skilled workmen can furnish. The plate holders (three in number) are of the folding or book form, with the slides hinged to fold back on withdrawal, as usual in the English form of cameras, but the leakage of light through this joint, so often complained of in this form of camera, is entirely avoided by the employment of a double rabbet at the joint, which precludes the possibility of any light entering thereat. In short, this camera is made and intended to be in all respects the most perfect in workmanship that can be provided, whilst in design it speaks for itself. The whole outfit is carried in a water-proof canvas case, with sling straps as in a knapsack. It is made in three sizes: 4x5, 5x7 and 6½x8½.

Mr. Joseph M. Wilson related some interesting experiences in connection with a trip made through several European countries during the past summer. He carried with him a Scovill hand camera and material for about seven hundred exposures, most of which was made use of before his return. The camera, in which several ingenious modifications and improvements had been made by Mr. Wilson, was shown, and also a light and convenient alpenstock tripod of his own design, which had been carried throughout the trip.

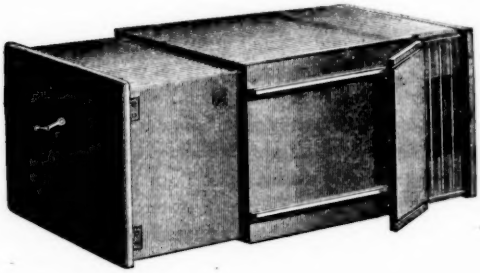
Dr. C. L. Mitchell showed a Blair Compact Camera mounted on a single leg or "Unipod" for use in instantaneous work in situations where a regular tripod could not conveniently be set up, and where more steadiness was desirable than could be maintained by holding the camera in the hand. With a large camera on board a yacht, or in street work, when sitting up a tripod would attract a troublesome crowd, the unipod had been very useful.

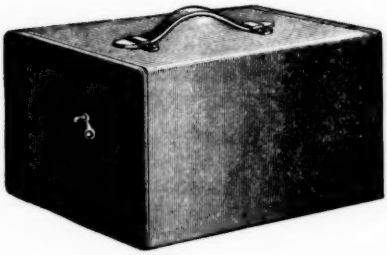
Mr. Wilkinson showed a hand camera obtained by him in Germany, the invention of Dr. Krugener. Glass plates 3¼ inches square were used, thirty being carried on the camera. The box was of oblong shape, about a foot long and four or five inches square. The camera proper was in the center of the box, the lens opening being at the side. Before use the plates were contained in a magazine at one end of the box, and by an ingenious contrivance, after each exposure the plate used was removed to a second magazine at the opposite end, and a fresh plate brought into place ready for the next exposure. The operation was continued until all the plates were exposed and transferred.

Mr. Francis Burrows also showed a new hand camera of his own design, which he described as follows:

I present to you this evening another candidate for your favor.—"The Ultimate," a 4x5 hand camera. It is compact, measuring 5x5¾x9 inches, and yet by drawing out the telescopic front, it will accommodate an eight-inch focus lens.

The front of the box opens, allowing access to the lens and shutter, while in the rear of the lens a flap shutter may be closed during this operation. This box is fitted with a 4x5 Pantagraph lens of 5¾ inch focus, and working *f*-6 approximately.





The shutter is of the rotary type, but is peculiar from the fact that its movement is always in the same direction. A small crank on the front board sets it by a part revolution, and a little farther movement of the same exposes; by this means the shutter is set without exposure of the plate, and generally at the last moment. With the spring at this tension the exposure is rapid enough to make all ordinary work, including landscapes, marine views, or animals. However, the shutter disc is double, and by releasing this small catch one-half may be revolved independently of the other, thus, you see, making the effective opening in the shutter one-half, one-quarter, or one twenty-fifth of its full size, and so giving the same fraction of the ordinary time of exposure. By releasing the spring the disc may be entirely revolved by hand, and the exposure timed. The opening and closing by this method being one simple movement, it is practicable to make the exposures very short.

On the bottom of this box you will notice a tripod plate and fitting for a finder. They do not belong to the box, but were placed on this, my model, for experiment. For those who wish such additions nothing can be more simple.

The rear compartment, opening at the bottom, contains a new locking arrangement, which holds one plate holder rigidly in place, while the other three drop loosely in back of it. A slight pull on this lock loosens the plate holder and lifts it out, while a strong pull draws the entire mechanism from its place, and makes place for a 3¼x3¼ Eastman roll holder, which slides into its bed with slight pressure.

The plate holders are of new design, very small, and of metal; they are double, and are loaded by removing both slides and the movable plug from the top. As any lens from 4½ to 8 in. focus may be fitted, the question of focusing comes up.

With this lens the front is drawn out about three-fourths of an inch, and there is a line drawn. In this position the lens cuts sharply to within about twenty feet. With an *f*-8 or *f*-11 stop everything beyond this distance is very sharp. Practically, I make all views at this point. About one-sixteenth of an inch back of this is another line. When drawn out to this we get better foreground effects, but the horizon will not be quite distinct, and should not be allowed to show unless it is possible to use a stop, as, for instance, a well-lighted subject, or one allowing time exposure.

In case I find it necessary to time a plate I am generally able to find something to place the camera, upon—a railing, bench, or stone; or I have made very sharp photographs of several seconds' exposure by holding the box firmly against the side of a house or tree. For those who will carry a tripod I can suggest nothing better.

On motion the meeting adjourned.

ROBERT S. REDFIELD, *Secretary.*

OUR ILLUSTRATION.

THE picture which graces our magazine for this month we owe to the kindness of Dr. Charles L. Mitchell, of this city.

Dr. Mitchell has given repeated evidence of his artistic skill in photography by the many beautiful examples contributed to the annual photographic displays, and it will be remembered that his photographs of landscapes received the diploma at the late Joint Exhibition in Philadelphia. The present example is one of that beautiful series.

Not only is the composition of the picture made very effective by the broad massing and gradation of the tones, but the artist has shown he understands just where to introduce figures in the landscape to make their presence effective. They seem to have casually stepped into the scene, so full of life and truth are they.

We are also indebted to the Crosscup & West Engraving Co., of this city, for the masterly manner in which this work of Dr. Mitchell has been reproduced. It is by the Ives celebrated process. It speaks for itself, and needs not our praise.

LITERARY AND BUSINESS NOTES.

A SERIOUS accident has just occurred from the explosion of Violet flash-light compound in the laboratory of Wiley & Wallace, 123 N. 7th street, Philadelphia, resulting in the instant death of three persons, and the injury of several others. Few particulars have as yet been obtained of the cause of the terrible disaster. The story, as told by the *Public Ledger*, is as follows:

It was about quarter before four o'clock when people passing along Seventh street, and on other streets in that vicinity, were startled by the report of a heavy explosion, which seemed to shake the ground on Seventh street. The report was followed by a crashing of glass and a cloud of dust, and what appeared to be smoke issued from the upper windows of the laboratory of Messrs. Wiley & Wallace. At the same moment a number of the employés of the establishment rushed out of the office door to the street, and the gathering crowd of people, attracted to the scene by the report of the explosion, were horrified to see a number of girls at the windows of the third floor, who apparently were getting ready to jump from the building. Men shouted to them to remain where they were, and a ladder having been procured it was placed against the building, but it was found to be too short, by about three feet, to reach the window where some of the girls were standing. Then they were told that there was no fire, and that it would be safer for them to wait until relief came. By this time several cool-headed men ran into the building, and the girls were all taken down a back stairway to Cherry street.

In the meantime policeman Manning, of the Sixth Ward Station, had turned in an alarm, and the arrival of the fire engines helped to increase the excitement. Lieutenant Burk, of the same station, also hurried to the scene with a squad of policemen, and started a search through the building. The first place visited was the basement, and in the extreme rear, in an area way, the searchers found three bodies, all shockingly burned and mutilated.

One body, from which both arms and legs had been torn, was discovered wedged behind some barrels. The clothes were burned, the face blackened and disfigured, and a portion of the breast gone. From the position in which the body was found, and from certain marks, it was believed to be that of Mr. Wiley. The other bodies were found lying near by in the area-way, one across the other. Both were badly disfigured, and were nearly stripped of clothing. These were subsequently identified as those of Rhinedollar and Lippman.

The bodies were taken in a patrol wagon and a Pennsylvania Hospital ambulance to the police station on Fifth street above Race.

Thomas was taken in an ambulance to the Jefferson Hospital, and after his injuries had been attended to he was sent home.

Kidd was taken to the Pennsylvania Hospital, where last night he was stated to be in an improved condition.

The other injured persons were able to go to their homes.

It will be remembered that a previous explosion, though not so serious, occurred at the same place a year ago, resulting in the death of John D. Cruice, aged sixteen years, who was mixing what is known as Violet powder in a sieve.

The boy's father recently brought suit against Wiley & Wallace to recover damages,—the case being still on trial at the time of the accident.

Dr. Henry Leffman testified, as a chemical expert, that the most dangerous ingredient used in the composition of some of these powders was picric acid. One of these powders, and the most dangerous one, has picric acid in combination with bichromate of potash. Another contains picric acid in combination with magnesium, permanganate of potash, bichromate of potash, chlorate of potash, and nitrate of potash. He said that the addition of water to a dry powder might increase the heat to such a degree as to cause the composition to explode; that picric acid alone was explosive,—a dangerous substance allied to gun-cotton; that the magnesium was not dangerous, but that the danger was in the association of the magnesium with any of the four kinds of potash mentioned, particularly with permanganate of potash and chlorate of potash. The danger in the materials, he said, is in the handling of them,—in trituration, mixing and rubbing. He said that flash powder is more dangerous than gunpowder, being more rapid and violent in action. It may explode without assignable cause.

It seems strange that the senior member of a firm extensively engaged in laboratory operations should not have been thoroughly acquainted with the dangerous character of the materials he was handling—especially as two serious accidents had previously occurred. The various photographic journals have from time to time warned their readers of the great danger attending the using of such compounds as contain picric acid, chlorate of potash, permanganate, and bichromate of potassa. The lives of five persons have been sacrificed in the manufacture of this Violet powder.

AMONG the other good papers in the November number of the *American Amateur Photographer* is an excellent sketch of the history of the Photographic Society of Philadelphia, written by Robt. S. Redfield, illustrated by a cut showing the Assembly Room of the Society. The Philadelphia Society is the pioneer organization of its kind in the United States, dating back to 1860. The present list of active members counts 225.

WE learn from the pages of the *St. Louis Photographer* that Mr. G. Cramer, the maker of the justly celebrated dry plate, contemplates another factory at Allentown, Pa., where he has already bought a handsome property.

It is said that this factory will even be on a grander scale than that in St. Louis, and that it will be in full operation about June, 1890.

The establishment of this plant in the East will be a great convenience to dealers, who can thus obtain their supplies at much reduced rates, and in shorter time. We are also told that Mr. Cramer will have on the market, ere long, an orthochromatic plate.

Welcome, Mr. Cramer, to Pennsylvania.

EIKONOGEN still continues to grow in favor as a developing agent, having received the encouragement of many experienced photographers. It is employed not only on regular negative work, but also in the development of lantern-slides and bromide prints. We were recently shown a number of prints on bromide paper developed with Eikonogen, which were everything one could desire in tone, clearness of the white, and good contrast. At the recent meeting of the Photographic Society of Philadelphia, lantern-slides made with Eikonogen were much admired for their beauty and softness.

Our own experience with the new developer has been very satisfactory. All our trials have been made with the first specimens of the chemical which were sent to this country. Some complain that the recent importation is not as good, requiring more than the first samples to produce the same effect. We have had some complaints, too, of a difficulty in securing density with Eikonogen, and, in one or two cases, of the formation of green fog attending prolonged development.

NOVEMBER BARGAIN LIST.

42 Select Lantern Slides, mostly foreign, very cheap.

Accessories:

1— 6-in. Oscillating Burnisher, .	$5 00
1—15-in. Oscillating Burnisher, .	10 00
1— 6-in. Eureka Burnisher, . .	8 00
1—Bromide Easel, with Kits up to 25x30	10 00
1—Haworth's Patent Camera Stand, for 8x10	6 00
1—Walmsley Reversible Finder	2 50
1—9x11 Glass Bath and Dipper .	1 80
1—Packard Rock	3 00
1—8x11 Exterior Background, light right	8 00
1—Card size Burnisher	3 00
1—Cameo Press	1 00
1—Rustic Wood Chair	5 00
1 copy Photo Mosaics for 1881, in cloth	50
1 copy Photo Colorists' Guide, .	75
1 copy About Photography and Photographers	50
British Journal Almanacs for 1889, reduced to	40
1—15-in Entrekin Rotary Burnisher	17 00
1—15-in Entrekin Eureka Burnisher	15 00
1—Fuming Box	4 00
1—15x18 Deep Porcelain Tray .	3 00
1—15x18 Japan Tray	50
1—Iron Centre Camera Stand, .	3 00
1—14-in Eureka Burnisher . .	16 00
1—Seavey Swiss Cottage Accessory	12 00
1—8x10 Exterior Ground, good condition, ...	10 00
2—Spencer Head-rests	5 00
British Journal Almanacs for 1878,	20
Photo Mosaics for 1883, ...	20
1—8x10 Plain painted ground .	3 00
1—8x10 Osborne's interior background, new, light left . . .	20 00
1—4x8 Osborne's side slip . .	7 50
Pearl leads, the best retouching point in the market, each .	15
5x8 Woodbury Dry Plates, PER DOZ.	80
4¼x6½ " " . . .	65
6½x8½ Triumph " . . .	85
5x7 " " . . .	55
4¼x6½ " " . . .	45
5x8 Neidhardt " . . .	65
4x5 Bridle " . . .	35
1—8x10 Hough's Exterior ground, good as new, light left of sitter	$9 00
1—8x10 Hough's Exterior ground, light right	8 00
1—Hough's Oak Stump	7 50
1—Osborne's No. 71 Rock Accessory	9 00
1—Osborne's Bridge Accessory .	8 00
1—Osborne's Gate Combination Accessory, new	18 00
1—Knickerbocker Camera Stand, with Acme top	5 00
1—6x6 Children's Fancy Ground	3 00
1—15 inch Smith & Pattison, Quadruplex Enameler, ...	25 00

Camera Boxes:

1—8x10 American Optical Co.'s Portrait Camera, double swing	16 00
1—4 x 5 Waterbury Detective Camera, fitted with Roli Holder, and Plate Holder, in good condition, ...	18 00
1—Gray's Vest Camera	9 00
1—Woodward Solar Camera, 7-in. condensing lens and ½ size Voigtlander lens	25 00
1—½ size Ferro. Camera, 4 tubes and stand	10 00
1—4x5 Flammang revolving back Camera, lens and tripod, new; reduced from $37 to . . .	25 00
1—17x20 American Optical Co.'s Double Swing Portrait Camera, Bonanza Holder, good as new	75 00
1—5x8 Blair View Camera, single swing	17 00
1—Climax Outfit, including chemicals, complete	3 50
1—17x20 D. S. View Camera, good condition	40 00
1—5x8 Tourist Outfit, including 5x8 Tourist Camera Box, 2 Daisy Plate Holders, 1 Extension Tripod, and 1 Canvas Carrying Case, very little used. Price, new, $40.50, will sell for	30 00
1—10x12 Cone View Camera, Double Swing, new	52 80
1—5x8 Wet Plate Stereo Camera, 3 holders, case and tripod	25 00
1—6½ x 8½ View Camera and Lens, ...	12 00
1—6½x8½ American Optical Co. first qual. View Camera . .	23 00

1—4¼x5½ Ex. qual. Portrait Camera 17 50
1—5x8 American Optical Co. Stereo Camera 25 00
1—5x8 Blair Compact Camera, good as new 35 00
4—5x8 Feather Weight Holders, each 75
1—8x10 Double Swing Cincinnati Portrait Camera 18 00
1—5x8 '76 View Camera, with lens holder, case and tripod 15 00
1—4x5 Anthony's View Camera, with lens, tripod, camera case and six double holders in good condition 16 00
1—½ size Wet Plate Camera, good for lantern slides . . . 2 00

Lenses:

1—No. 4 Darlot Rapid Hemispherical Lens, ... 35 00
1—¼ size Darlot Portrait Lens, 5 00
1—¼ size Harrison Lens . . . 5 00
1—4x5 Rectilinear Lens 5 00
1—5x8 Morrison Wide Angle Lens, ... 18 00
1—4–4 Harrison Portrait Lens . 18 00
1—6½x8½ View Lens 3 50
1 set ⅛ Tubes 18 00
1—11x14 Zentmayer Lens, with all the smaller combinations . 50 00
1—Matched pair E. A. Stereoscopic Lenses 8 00
1—14x17 Voigtlander Portrait Lens 60 00
1—No. 9, 11x14, Ross Portable Symmetrical Lens 60 00
1—11x14 Harrison Double View Lens 15 00
1—4x5 J. A. K. Single View Lens 2 00
1—Extra 4–4 Roettger Portrait Lens 20 00
1—2A Dallmeyer Lens 82 00
1—14x17 Roettger Lens 45 00
1—8x10 Beck Lens, good as new, fitted with Prosch Shutter . 55 00
1—set ¼ Darlot Tubes 13 00
1—4–4 Holmes, Booth & Hayden Portrait Lens 25 00
1—¼ size Voigtlander Lens . . 25 00
1—⅓ size L. W. Krantz Portrait Lens 12 50
1—⅓ size C. C. Harrison Portrait Lens 8 00
1—½ size Darlot quick acting Portrait Lens, central stops . 18 00
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